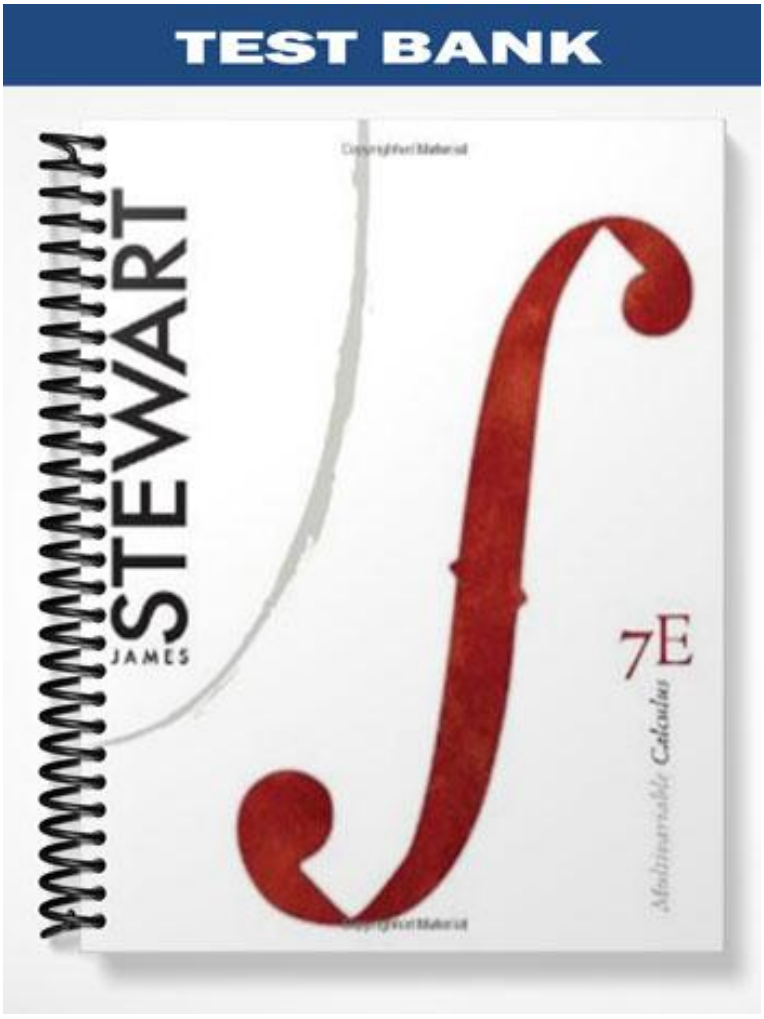
TEST BANK



NUMERIC RESPONSE

1. If an equation of the tangent line to the curve $y = f(x)$ at the point where $a = 2$ is $y = 4x - 5$, find $f(2)$ and $f'(2)$.

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   ANS: $f(2) = 3$

   $f'(2) = 4$

   PTS: 1 DIF: Medium MSC: Numerical Response
   NOT: Section 2.1

2. Find the points on the curve $y = 2x^3 + 3x^2 - 12x + 1$ where the tangent is horizontal.

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   ANS: $(1, -6), (-2, 21)$

   PTS: 1 DIF: Medium MSC: Numerical Response
   NOT: Section 2.3

3. Find the equation of the tangent to the curve at the given point.

   $y = \sqrt{1 + 4\sin x}, \ (0, 1)$

   _____

   ANS: $y = 2x + 1$

   PTS: 1 DIF: Medium MSC: Numerical Response
   NOT: Section 2.5

4. Differentiate.

   $g(x) = x^7 \cos x$

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   ANS: $g'(x) = 7x^6 \cos(x) - x^7 \sin(x)$

   PTS: 1 DIF: Medium MSC: Numerical Response
   NOT: Section 2.4

5. Find f' in terms of g'.

$f(x) = x^2 g(x)$

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ANS: $f'(x) = 2xg(x) + x^2 g'(x)$

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.3

6. The height (in meters) of a projectile shot vertically upward from a point 2 m above ground level with an initial velocity of 24.5 m/s is $h = 2 + 24.5t - 4.9t^2$ after *t* seconds.

a) When does the projectile reach its maximum height?
b) What is the maximum height?

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ANS: a) 2.5 s

b) 32.625 m

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.7

7. Use implicit differentiation to find an equation of the tangent line to the curve at the given point.

$y \sin 2x = x \cos 2y, \left(\frac{\pi}{2}, \frac{\pi}{4} \right)$

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ANS: $y = \frac{1}{2} x$

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.6

8. Calculate y'.

$y = \sqrt{x} \cos \sqrt{x}$

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ANS: $y' = -\frac{1}{2} \left(\frac{\sqrt{x} \sin \sqrt{x} - \cos \sqrt{x}}{\sqrt{x}} \right)$

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.5

9. A spherical balloon is being inflated. Find the rate of increase of the surface area $S = 4\pi r^2$ with respect to the radius r when $r = 1$ ft.

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ANS: 8π

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.7

10. Find the derivative of the function.

$$y = 2\cos^{-1}\left(\sin^{-1} t\right)$$

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ANS: $y' = -\dfrac{2}{\sqrt{\left(1-t^2\right)\left(1-\left(\sin^{-1}(t)\right)^2\right)}}$

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.5

11. Find an equation of the tangent line to the curve.

$$y = \frac{\sqrt{x}}{x+6} \text{ at } \left(4,\ 0.2\right)$$

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ANS: $y = \dfrac{1}{200}(x-4) + 0.2$

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.1

12. The top of a ladder slides down a vertical wall at a rate of 0.15 m/s . At the moment when the bottom of the ladder is 3 m from the wall, it slides away from the wall at a rate of 0.2 m/s . How long is the ladder?

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ANS: 5 m

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.8

13. Find the limit if $g(x) = x^5$.

$\lim_{x \to 2} \dfrac{g(x) - g(2)}{x - 2}$

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ANS: 80

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.4

14. A company makes computer chips from square wafers of silicon. It wants to keep the side length of a wafer very close to 16 mm. The area is $A(x)$. Find $A'(16)$.

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ANS: 32

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.7

15. Calculate y'.

$xy^4 + x^2y = x + 3y$

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ANS: $y' = \dfrac{1 - y^4 - 2xy}{4xy^3 + x^2 - 3}$

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.6

16. Find the first and the second derivatives of the function.

$y = \dfrac{x}{3 - x}$

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ANS: $3(3 - x)^{-2}$, $6(3 - x)^{-3}$

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.3

17. Find the given derivative by finding the first few derivatives and observing the pattern that occurs.

$\dfrac{d^{75}}{dx^{75}} (\sin x)$

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ANS: $-\cos x$

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.4

18. If $y = 2x^3 + 5x$ and $\frac{dx}{dt} = 3$, find $\frac{dy}{dt}$ when $x = 5$.

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ANS: 465

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.6

19. The volume of a cube is increasing at a rate of $10\,\text{cm}^3/\text{min}$. How fast is the surface area increasing when the length of an edge is 30 *cm* .

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ANS: $\frac{4}{3}\,\text{cm}^2/\text{min}$

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.8

20. If $f(t) = \frac{18}{3+t^2}$ find $f'(t)$.

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ANS: $\frac{-36t}{\left(3+t^2\right)^2}$

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 2.3