

Click [here](#) for an answer key.

This test has pages 1 – 6. Take a moment to make sure you have them all.

No Calculators Allowed; No Reference Materials; Just You and Your Pencil and Eraser. Show your steps.

- 1 Make a labeled sign chart for the expression

$$\frac{x(x - 3)^2(x + 4)}{x - 2}$$

- 2 Factor the expression: $6(u + 1)^5(u + 6)^4 + 4(u + 1)^6(u + 6)^3$

3 Write down the following:

(a) The limit definition of $f'(A)$.

(b) The definition of the phrase “ f is **continuous** at $x = a$ ”.

(c) The definition of the phrase “ f is **differentiable** at $x = a$ ”.

(d) Cauchy’s definition of $\lim_{x \rightarrow a} f(x) = L$, where a and L are finite real numbers.

4 Choose one of the following parts (A)-(C): use the limit definition of the derivative and show steps in computing $f'(x)$ if

(A) $f(x) = 11 - 8x - 9x^2$

(B) $f(x) = \frac{1}{x^2 + 3}$

(C) $f(x) = \sqrt{3x + 2}$

Note that C is worth more points than B, which in turn is worth more points than A. Show your steps..

5 Show steps in computing the limit: $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x^4 - 16}$

6 Show steps in computing the limit: $\lim_{x \rightarrow +\infty} (\sqrt{9x^2 + 42x} - 3x)$

- 7 Use our new short-cut derivative-finding methods to find an equation for the line tangent to the graph of

$$f(x) = x^3 + 3x^2 - 24x + 9$$

at the point where $x = -1$

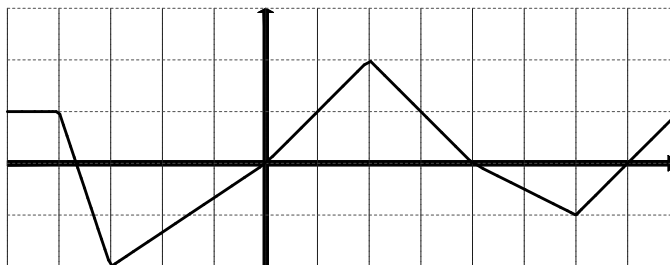
- 8 Find equations for the horizontal tangent lines for the graph of the function f in problem 7

9 Evaluate the integrals:

(a) $\int_{-10}^0 \sqrt{100 - x^2} dx$

(b) $\int_{-2}^2 |x + 1| dx$

10 On this graph of function f , the coordinate squares are one unit on a side:



Give numerical values for the following:

(a) $f(3)$ _____

(d) $f'(2)$ _____

(g) $\int_0^4 f(x) dx$ _____

(b) $f'(3)$ _____

(e) $f'(-2)$ _____

(h) $\int_0^3 f(x + 4) dx$ _____

(c) $f'(5)$ _____

(f) $\int_{-3}^0 f(x) dx$ _____

(i) $\frac{f(4) - f(1)}{4 - 1}$ _____