MTH 121 — Fall — 2004

Essex County College — Division of Mathematics

Test # 3[1] — Created December 9, 2004

Name: _____

Signature: _____

Show all work *clearly* and in *order*, and box your final answers. Justify your answers algebraically whenever possible. You have at most 80 minutes to take this 100 point exam. No cellular phones allowed.

1. (10 points) — Find the equations of the tangent line to the curve at the given point.

$$y = \sqrt{2x+1} \qquad (4, 3)$$

[1] This document was prepared by Ron Bannon using LaTeX.

2. (10 points) — Find $f'(x)$ by using the definition.

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

3. (10 points) — Find $f'(x)$.

$$f(x) = \frac{\sqrt{x}}{x+1}$$

4. (10 points) — Find Find $f'(x)$.

$$f(x) = \sin\left(x^2 + 2x - 1\right)$$

5. (10 points) — Find $\frac{\mathrm{d}y}{\mathrm{d}x}$.

$$y^5 + 3x^2y^2 + 5x^4 = 12$$

6. (10 points) — Set up an expression for

$$\int_0^{\pi} \sin x \, \mathrm{d}x$$

as a limit of sums. **Do not evlauate.**

7. (10 points) — Evaluate.

$$\int_{-1}^{7} \sqrt{4+3x}\ \mathrm{d}x$$

8. (10 points) — Evaluate.

$$\int_0^{\sqrt{\frac{\pi}{2}}} x \cos\left(x^2\right) \, \mathrm{d}x$$

9. (10 points) — Evaluate.

$$\int_{-1}^{1} \frac{1}{(2x-3)^2}\,\mathrm{d}x$$

10. (10 points total) — Given:

$$\begin{aligned} f(x) &= 2\cos x + \sin 2x \\ f'(x) &= -2(2\sin x - 1)(\sin x + 1) \\ f''(x) &= -2\cos x(1 + 4\sin x) \end{aligned}$$

Answer the following questions where $f(x)$ is restricted to the interval $\left[-\frac{\pi}{2}, \frac{3\pi}{2}\right]$.

(a) (4 points) — range:

(b) (3 points) — global maximum(s):

(c) (3 points) — global minimum(s):