

Here is how page 1 of your midterm will look:

## AMAT 309 MIDTERM EXAMINATION

March 2, 2006

Name ( please print): \_\_\_\_\_

I.D. \_\_\_\_\_

**Instructions:** The points for each problem are indicated in parentheses. Use the back of any page for answers or rough work as needed. No calculators, notes, texts, or other aids are allowed. Work as many problems as you can. Answers must be accompanied by adequate justification. **Time:** 90 minutes

### Useful Formulas

$$\begin{aligned} \mathbf{B} &= \mathbf{T} \times \mathbf{N}; & \mathbf{N} &= \mathbf{B} \times \mathbf{T}; & \mathbf{T} &= \mathbf{N} \times \mathbf{B} \\ \frac{d\mathbf{T}}{ds} &= \kappa\mathbf{N} & \frac{d\mathbf{N}}{ds} &= -\kappa\mathbf{T} + \tau\mathbf{B} & \frac{d\mathbf{B}}{ds} &= -\tau\mathbf{N} \\ \mathbf{B} &= \frac{\mathbf{v} \times \mathbf{a}}{|\mathbf{v} \times \mathbf{a}|} & \kappa &= \frac{|\mathbf{v} \times \mathbf{a}|}{|\mathbf{v}|^3} & \tau &= \frac{(\mathbf{v} \times \mathbf{a}) \cdot \left(\frac{d\mathbf{a}}{dt}\right)}{|\mathbf{v} \times \mathbf{a}|^2} \\ \mathbf{a} &= \frac{dv}{dt}\mathbf{T} + v^2\kappa\mathbf{N} & \kappa(x) &= \frac{|f''(x)|}{[1 + (f'(x))^2]^{3/2}} \end{aligned}$$